

AD-A102 116

WASHINGTON UNIV SEATTLE GRADUATE SCHOOL OF BUSINESS --ETC F/G 5/9  
HYPOTHESES ON REINFORCING PROPERTIES OF INCENTIVES CONTINGENT U--ETC(U)  
JUN 81 L M SAARI, G P LATHAM N00014-79-C-0680

UNCLASSIFIED TR-GS-11 NL

1 01  
AD-A  
102116

END  
DATE  
FILED  
9-81  
DTIC

AD A102116

FILE COPY

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (and any Page Reprinted)

# LEVEL II

**READ INSTRUCTIONS  
BEFORE COMPLETING FORM**

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 68 IS OBSOLETE  
S/N 0102-LF-014-6601

Unclassified

404374

~~SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)~~

20. Abstract (continued)

goals for themselves as a result of the incentive program. Those trappers who set goals had higher performance than those who did not have specific goals. Interviews and questionnaires indicated that the VR-4 schedule may have been effective because it was perceived by the workers as containing many job enrichment variables such as bringing about feelings of accomplishment, recognition, variety, and feedback.

HYPOTHESES ON REINFORCING PROPERTIES  
OF INCENTIVES CONTINGENT UPON PERFORMANCE

Lise M. Saari

Gary P. Latham

University of Washington

Accession For	
NTIS	GRA&I
DTIC TAB	<input checked="" type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A	

#### ABSTRACT

A field study was conducted with 12 mountain beaver trappers to examine the effects of two schedules of monetary reinforcement (continuous and VR-4) on job performance, and to identify the reinforcing characteristics of these two reinforcement schedules. Consistent with operant theory, performance was higher on the VR-4 schedule than on the continuous schedule. Of major interest was the finding that 9 of the 12 trappers reported setting specific goals for themselves as a result of the incentive program. Those trappers who set goals had higher performance than those who did not have specific goals. Interviews and questionnaires indicated that the VR-4 schedule may have been effective because it was perceived by the workers as containing many job enrichment variables such as bringing about feelings of accomplishment, recognition, variety, and feedback.

## INTRODUCTION

While a behavioristic approach allows one to determine whether different schedules of reinforcement affect response rates in different ways, it does not provide an explanation of how or why response rates are affected. Unless one knows why and/or how something "works", it is difficult, if not impossible, to predict accurately when it will work, or even that it will work under certain circumstances. A "trial and error" approach, that is, presenting or removing a reinforcer following a specific response, is not a cost effective policy for most organizations. It would be useful for managers, if not scientists, to have sound reasons for believing on an a priori basis that changing a given consequence or set of consequences will produce a desired outcome. Moreover, an understanding of the reinforcement process should help scientists and managers determine why changing specific consequences does not change behavior in some cases.

The importance of investigating the process of reinforcement in organizational settings has been stressed by both Campbell (1977) and Locke (1977). With regard to the use of operant techniques in the study of leadership, Campbell (1977) stated:

The reward value of a stimulus (i.e., outcome) can only really be known through its effects. Thus, we need more investigation of what outcomes actually alter behavior. Too many people ... assume they already know the reinforcing properties of particular stimuli. (p. 228)

In addition, Locke (1977) noted that:

... concepts like 'reinforcement' delude investigators into thinking they understand the organism's behavior, and thus cut off the search for the real causes, i.e., those characteristics of the organism, including its mental contents and processes, which can help explain why it reacted as it did in response to, or in the absence of, so-called reinforcement. (p. 550)

For example, money is a reinforcer for most people when it is made contingent upon demonstrating a specific response or response chain (Bijou & Baer, 1966; Latham & Dossett, 1978). However, it is not always clear why it is a reinforcer. In doing work in industry, we have talked to employees for whom it is apparent that money is not reinforcing. Some independently employed loggers who are paid on a piece rate basis frequently do not work on Fridays. They state that they make enough money by Thursday to pay for such things as car repairs and the cost of going out on the weekend. Why is it that they become satiated and no longer engage in behavior that is followed by money, while other people continue to repeat behavior for which money is an immediate consequence? Blithely explaining that the answer lies somewhere in each individual's history of reinforcement is not useful information for managerial decision-making. Furthermore, if an incentive program is to be discontinued for some reason, it would be useful for managers to know what stimulus properties exist in an organization that may be as effective, if not more so, than making money contingent upon an employee's performance.

One purpose of the present study was to examine the effectiveness of operant techniques in an industrial setting. In this way it was essentially a replication of Latham and Dossett's (1978) research on trappers of mountain beaver (a large nocturnal rodent, resembling a woodchuck, that eats tree seedlings). The primary purpose of this study, however, was to develop hypotheses concerning the reinforcing properties of monetary incentives contingent upon performance.

#### METHOD

##### Subjects

Twelve mountain beaver trappers participated in the study. This is the total number of trappers who worked for a forest products company during the trapping season. The company is located in southwestern Washington. All the trappers were males with a high school education. All were members of a strong international union. Their ages ranged from 21 to 40.

##### Procedure

Prior to the implementation of the incentive program, baseline measures were taken for four consecutive weeks. Following this, the trappers were randomly divided into two groups. These two groups then alternated, on a weekly basis, on a continuous or a variable ratio four (VR-4) schedule of reinforcement. This continued for a total of 16 weeks, which is the entire trapping season. When a trapper was on the continuous schedule of reinforcement, he immediately received one dollar for every beaver that he presented to the supervisor. Whereas, when a trapper was on the VR-4 schedule, he immediately received four dollars contingent upon the response chain of presenting a beaver to the

supervisor and correctly predicting twice whether the roll of a dice would yield an even or an odd number.

During the trapping season, the authors observed the employees on the job, and conducted one-on-one interviews. Each trapper was asked: (a) what, if anything, about the incentive program motivated him to trap beaver, (b) if he believed either schedule of reinforcement was effective, and (c) why a schedule was effective or ineffective. On the basis of responses obtained in the interviews, a questionnaire was developed and administered in an attempt to understand the differences, if any, between the reinforcing properties of the two reinforcement schedules.

#### RESULTS AND DISCUSSION

With regard to performance, it was found that the number of animals trapped per hour increased significantly (premeasures  $\bar{X} = .52$ ,  $SD = .08$ ) after the reinforcement program had been implemented ( $\bar{X} = .93$ ,  $SD = .14$ ;  $t = 12.2$ ,  $df = 11$ ,  $p < .05$ ). It was found that performance on the continuous schedule ( $\bar{X} = .78$ ,  $SD = .20$ ) was 50% greater than performance during the premeasure, while the VR-4 schedule ( $\bar{X} = 1.08$ ,  $SD = .23$ ) resulted in a performance increase of 108%. Moreover, similar to Latham and Dossett's (1978) findings, performance was significantly higher on the VR-4 schedule than on the continuous schedule of reinforcement ( $t = 3.15$ ,  $df = 11$ ,  $p < .05$ ).

A major hypothesis that may be warranted from the responses to the interviews and questionnaires is that making money an immediate consequence of a desired response or response chain increases performance because it leads to the setting of specific goals. Of the twelve trappers, nine reported that they

began setting specific goals for themselves as to how many beavers they wanted to catch for the week as a result of the incentive program. Those who set goals were more productive than those who did not ( $\bar{X} = .95$ ,  $SD = .16$ ;  $\bar{X} = .87$ ,  $SD = .08$ , respectively). Although this difference is not statistically significant with this small sample, there is ample empirical evidence that setting specific goals leads to substantial increases in performance (Latham & Yukl, 1975; Latham & Locke, 1979; Locke, Shaw, Saari & Latham, in press). Moreover, all the employees reported that since the implementation of the incentive program, they had begun to record the number of beaver they each caught, thus providing themselves with performance feedback. Feedback in conjunction with goal setting is not only an effective motivational technique in itself (Komaki, Waddell & Pearce, 1977) but together they form the core of most, if not all, current motivational theories (Locke, 1978).

In examining the process by which the different schedules of reinforcement affected response rates, the responses to the questionnaire are at best descriptive. Moreover, they should be considered hypotheses to be systematically tested in subsequent studies since the employment situation in the present study was very specialized and the sample size was small.

The questionnaires completed by the trappers contained 33 items. Each trapper rated each item on the degree (1-5) to which he felt it described the continuous schedule and the VR-4 schedule. As previously stated, these items were obtained from interviews with each trapper and included such things as:

takes the dullness out of my work; generates a lot of excitement; gives me something to talk about at the tavern; makes my job meaningful; leads to getting attention from others when I do well; gives me a feeling of accomplishment.

It was found that the sum of the 33 item ratings for the VR-4 schedule ( $\bar{X} = 130$ ,  $SD = 32$ ) was significantly higher than the summed ratings for the continuous schedule of reinforcement ( $\bar{X} = 110$ ,  $SD = 41$ ; sign test,  $N = 12$ ,  $p < .001$ ). The internal consistencies (Cronbach's alpha) for the VR-4 items and continuous items were .98 and .99, respectively.

The items that differentiated between the VR-4 and continuous schedules of reinforcement did not appear to be money per se, but rather included such things as accomplishment, recognition, significance, feedback, variety, and meaningfulness -- variables stressed by job enrichment theorists (e.g., Herzberg, 1968; Hackman & Lawler, 1971). In fact, when the trappers rated the importance of the items on the questionnaire, all were rated as important, if not more important, than the money itself.

In order to determine whether the items describing the VR-4 schedule of reinforcement were in fact job enrichment variables, the questionnaire was expanded to include 47 additional randomly placed items which were hypothesized as not describing intrinsic, job enrichment variables. These items described such things as working conditions, pay, company policy, and job security -- variables described by Herzberg (1968) as not contributing to job enrichment. Each of the 89 items was then rated by 2 personnel representatives for the company where this study was conducted. Each item was rated as either a hygiene or a motivator variable. Both personnel representatives were familiar with job

enrichment theory but were unaware which items had been included on the trapper questionnaire.

There was significant agreement ( $r = .64$ ,  $p < .001$ ) between the two personnel representatives in their ratings. It was also found that the 33 items from the trapper questionnaire were in fact rated as more likely to be job enrichment variables than the items hypothesized as not being job enrichment variables ( $\bar{X} = .89$ ,  $SD = .21$ ;  $\bar{X} = .13$ ,  $SD = .27$ , respectively;  $t = 14.5$ ,  $df = 78$ ,  $p < .001$ ). Thus, it would appear that these types of variables may have contributed to the higher performance of the trappers on the VR-4 schedule. Information such as this may help provide managers and scientists with hypotheses to work with when searching for effective reinforcers.

Job enrichment theorists would argue that such variables as variety, recognition, feedback, meaningfulness, and accomplishment should be incorporated into jobs as givens. However, we would argue that if these things are reinforcing for individuals, they should be made contingent upon a person engaging in specific behaviors so that specific goals are set and managers can be relatively certain that the desired behaviors will in fact occur on a regular basis. Where job enrichment variables have been provided regardless of employee performance, and goals have not been set, the effects on performance have been minimal (Umstot, Bell & Mitchell, 1976). This suggests that research needs to be conducted on ways that job enrichment variables can be made immediately contingent upon the performance of employees (e.g., Blood, 1978).

The question of why something is reinforcing is in some ways infinitely regressive. But the answers are necessary if we are to move beyond trial and error decision making with regard to implementing reinforcement programs. Why

Is it that accomplishment, recognition, and meaningfulness increased productivity? On the basis of observations, interviews, and questionnaires it would appear that the present program encouraged the trappers to develop new skills for setting traps, whereas before they viewed catching an animal as largely a result of luck. The program instilled interest and challenge into their job; it suddenly made their accomplishments salient to their peers, to their supervisor, and to themselves. The feedback and recognition they received may have been what led to the setting of specific goals. In short, as a result of the program the employees believed they had "reasons" for trapping the animals, and taking pride in being trappers.

Further research is needed on integrating cognitive and operant approaches for predicting, understanding, and controlling behavior. As Bandura (1977) and we (Latham & Saari, 1979) have said in the past, it is time to move beyond truncated theory building where we look only at environmental or only at cognitive variables. Investigations are needed on reciprocal interactions among cognitive, behavioral, and environmental influences. Managers need this information and so do behavioral scientists.

## REFERENCES

Bandura, A. Social learning theory. Englewood Cliffs, N.J.: Prentice-Hall, 1977.

Bijou, S. W., & Baer, D. M. Operant methods in child behavior and development. In W. K. Honig (Ed.), Operant behavior: Areas of research and application. New York: Appleton-Century-Crofts, 1966.

Blood, M. R. Organizational control of performance through self rewarding. In S. Strenfer, F. E. Fiedler, and B. T. King (Eds.), Managerial control and organizational democracy. New York: Halsted Press, 1978.

Campbell, J. F. The cutting edge of leadership: An overview. In J. C. Hunt and L. L. Larson (Eds.), Leadership: The cutting edge. Carbondale, IL: Southern Illinois University Press, 1977.

Hackman, J. R., & Lawler, E. E. Employee reactions to job characteristics. Journal of Applied Psychology, 1971, 55, 259-286.

Herzberg, F. A. One more time: How do you motivate employees? Harvard Business Review, (January-February) 1968, 46, 53-62.

Komaki, J., Waddell, W. M., & Pearce, M. G. The applied behavior analysis approach and individual employees: Improving performance in two small businesses. Organizational Behavior and Human Performance, 1977, 19, 337-352.

Latham, G. P., & Dossett, D. L. Designing incentive plans for unionized employees: A comparison of continuous and variable ratio reinforcement schedules. Personnel Psychology, 1978, 31, 47-61.

Latham, G. P., & Locke, E. A. Goal setting: A motivational technique that works. Organizational Dynamics, Autumn, 1979, 68-80.

Latham, G. P., & Saari, L. M. Application of social-learning theory to training supervisors through behavioral modeling. Journal of Applied Psychology, 1979, 64, 239-246.

Latham, G. P., & Yukl, G. A. A review of research on the application of goal setting in organizations. Academy of Management Journal, 1975, 18, 824-845.

Locke, E. A. The myths of behavior mod in organizations. Academy of Management Review, 1977, 2, 543-553.

Locke, E. A. The ubiquity of the technique of goal setting in theories of and approaches to employee motivation. Academy of Management Review, 1978, 3, 594-601.

Locke, E. A., Shaw, K. N., Saari, L. M., & Latham, G. P. Goal setting and task performance: 1969-1980. Psychological Bulletin, in press.

Umstot, D. D., Bell, C. H., & Mitchell, T. R. Effects of job enrichment and task goals on satisfaction and productivity: Implications for job design. Journal of Applied Psychology, 1976, 61, 379-394.

